Prototype Oil Shale Program and Environmental Advisory Panel

March 1982 Summary

United States Department of the Interior

OIL SHALE ENVIRONMENTAL ADVISORY PANEL
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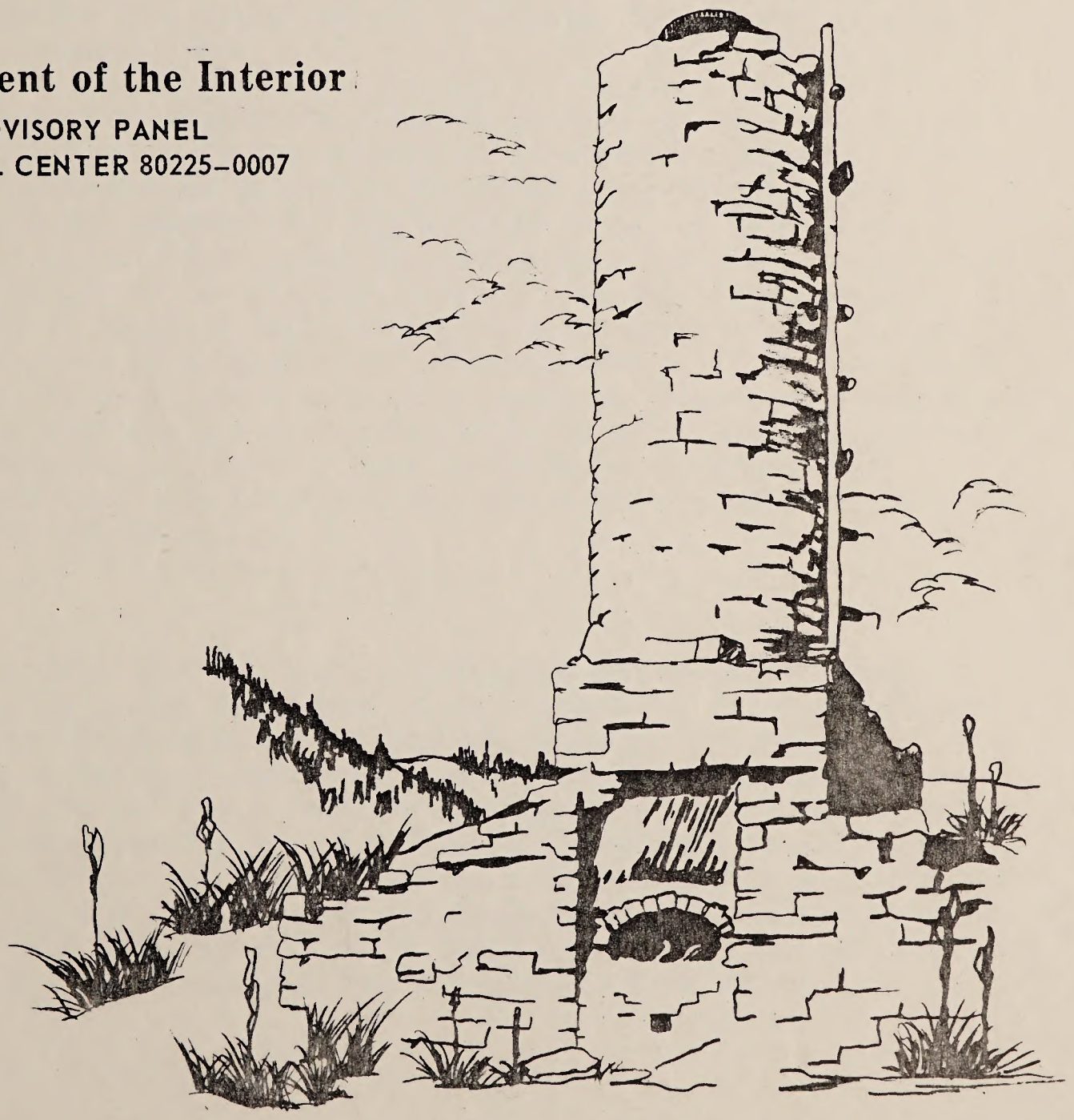


PROTOTYPE OIL SHALE PROGRAM AND ENVIRONMENTAL ADVISORY PANEL

Introduction

This summary was first issued in March 1979 to update narrative reports on OSEAP which were published in the spring of 1975 and 1976. This edition is intended to provide a concise report on panel operations and the current status of the Prototype Program. It will be revised as future developments warrant.

Background

Resources

The term oil shale is applied to any sedimentary rock containing a solid organic material derived chiefly from aquatic organisms which, when subjected to temperatures of about 900 °F, will yield a significant quantity of synthetic crude oil. Thus, the term is a misnomer as technically it contains no oil and the deposits here discussed are not shale, but an organic marlstone formed in an ancient lake.

There is the equivalent of almost two trillion barrels of shale oil in beds of the Eocene Green River Formation located in northwestern Colorado, northeastern Utah, and southwestern Wyoming. The total areal extent of the deposits is about 25,000 square miles (16 million acres) of which some 17,000 square miles (11 million acres) are believed to contain oil shale with the potential for commercial development. High grade oil shale deposits (defined as in beds at least 10 feet in thickness and averaging 25 or more gallons per ton) contain an estimated 731 billion barrels with 83 percent in Colorado, 9 percent in Utah, and 8 percent in Wyoming. Potentially valuable sodium and aluminum minerals are associated with the oil shale in a portion of the Colorado deposits. Extensive trona deposits in the Green River Formation in Wyoming have been developed and supply the raw material for most of the domestic soda ash industry.

Ownership/Status

Approximately 80 percent of the oil shale resources are on public lands administered primarily by the Department of the Interior. Prior to 1920 oil shale was subject to the General Mining Law and, through its operation (location and patenting of mining claims), title was transferred to most of the 20 percent or so of the oil shale lands in the region which are now in private ownership. The Mineral Leasing Act of 1920 made oil shale a leasable mineral and restricted the size of oil shale leases to 5,120 acres with an individual or company limited to one such lease or its equivalent in pro rata shares of joint ventures. Since 1930, the oil shale lands have been withdrawn from disposal and leasing, and since 1968 from all mining claim locations.

The Prototype Program

Origin and Development

An experimental oil shale leasing program was unsuccessful in 1968. In early 1970, a small task force was established within the Interior Department to evaluate the prospects for oil shale development, the national energy situation, and to devise a limited oil shale leasing and development program which would have a reasonable chance of success. During the next 3 years, this effort evolved into the present Prototype Oil Shale Leasing Program. This was also the period of the administrative and judicial interpretation of the NEPA (National Environmental Policy Act of 1969). The oil shale program planning effort, which involved an ever-widening circle of Federal, State, and local agencies, was the subject of several congressional and public hearings, and became increasingly focused on meeting the NEPA requirements. June 1971 saw the release of a Preliminary Draft EIS (Environmental Impact Statement), a Program Statement, and three State Reports which were followed by a three-volume Draft EIS in September 1972. The effort was completed with release of the six-volume Final EIS in August 1973. In November 1973, the Secretary of the Interior announced the decision to implement the program, leasing terms were released, and lease sales scheduled for early 1974.

Program Goals

1. To provide a new source of energy to the Nation by stimulating the development of commercial oil shale technology by private industry;

2. To ensure the environmental integrity of the affected areas and, at the same time, develop a full range of environmental safeguards and restoration techniques that will be incorporated into the planning of a mature oil shale industry, should one develop;

3. To permit an equitable return to all parties in the development of this public resource; and

4. To develop management expertise in the leasing and supervision of oil shale development in order to provide the basis for future administrative procedures.

Provisions

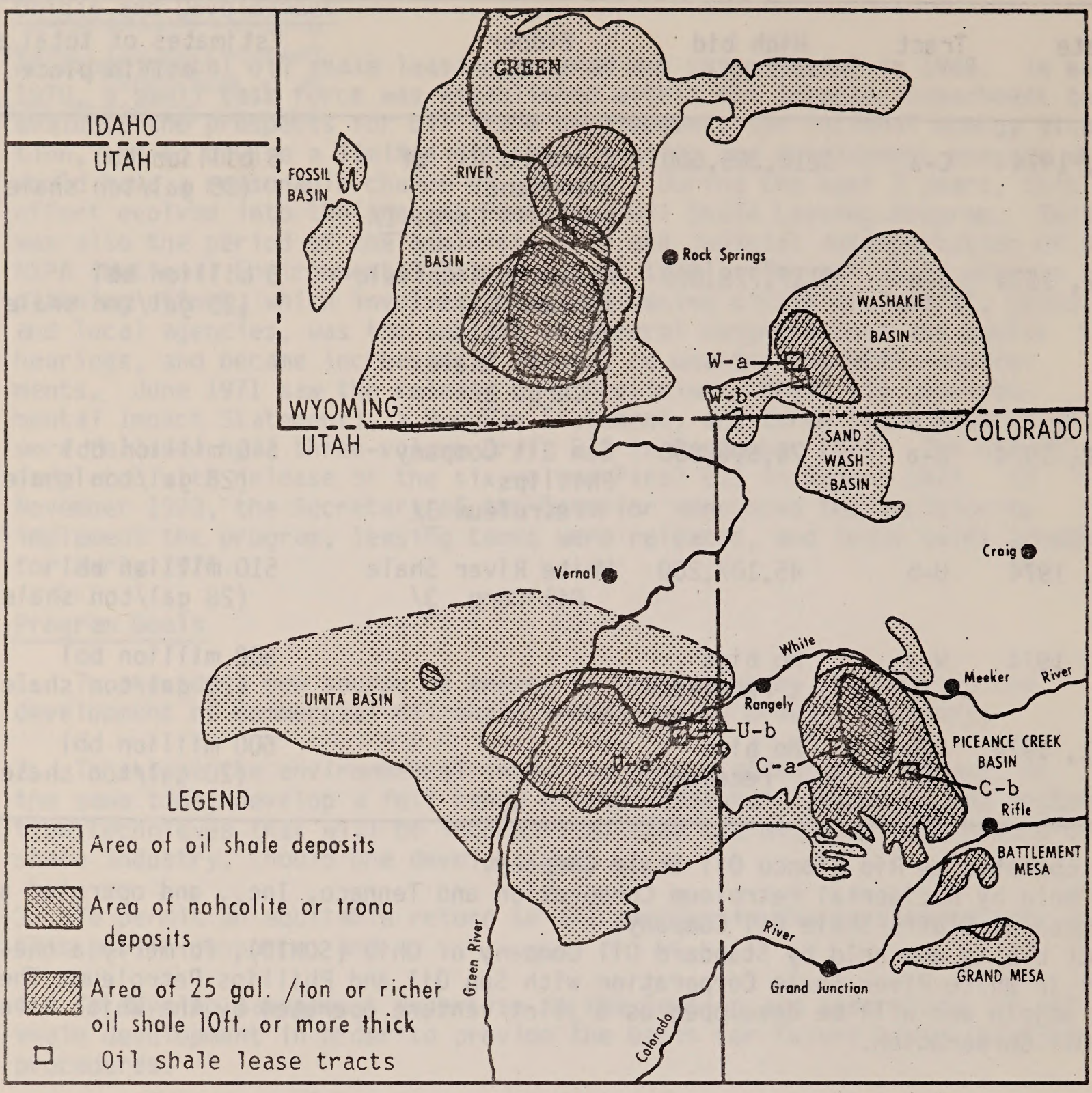
1. Leases were offered competitively for cash bonuses with minimum royalty payments beginning in the sixth year and accelerating thereafter to encourage development and actual production. Bonus bids were payable in five equal installments, with development expenditures creditable against the last two payments.

2. The leases provide stringent environmental protection requirements, for review and Government approval of development plans and for adding further environmental requirements, if needed, at a later date. Full compliance with State and Federal pollution control and environmental quality laws is required.

Lease Sales

Date	Tract	High bid	Bidder	Estimates of total shale oil in place
Jan. 8, 1974	C-a	$210,305,600	Standard Oil of Indiana Gulf Oil Corp. 1/	6 billion bbl (25 gal/ton shale)
Feb. 12, 1974	C-b	$117,778,000	Atlantic Richfield Ashland Oil Shell Oil The Oil Shale Corp. 2/	8 billion bbl (25 gal/ton shale)
Mar. 12, 1974	U-a	75,596,800	Sun Oil Company Phillips Petroleum 3/	540 million bbl (28 gal/ton shale)
Apr. 9, 1974	U-b	45,107,200	White River Shale Oil Corp. 3/	510 million bbl (28 gal/ton shale)
May 13, 1974	W-a	No bids received		600 million bbl (20 gal/ton shale)
June 11, 1974	W-b	No bids received		600 million bbl (20 gal/ton shale)

1/ Now operated as Rio Blanco Oil Shale Company.
2/ Now held by Occidental Petroleum Corporation and Tenneco, Inc., and operated as the Cathedral Bluffs Shale Oil Company.
3/ Tract U-b is now held by Standard Oil Company of Ohio (SOHIO), formerly a one-third partner in White River Shale Corporation with Sun Oil and Phillips Petroleum. The two tracts adjoin and will be developed as a joint venture operated by the White River Shale Oil Corporation.



OIL SHALE AREAS IN COLORADO, UTAH, AND WYOMING

Post-leasing Activities

Preliminary development plans were submitted, as required, within 48 hours of announcement of successful bidders. The Conservation Division of the USGS (U.S. Geological Survey) (presently Minerals Management Service) established the AOSO (Area Oil Shale Office) in Grand Junction, Colorado, in June 1974. The Oil Shale Manager has primary responsibility for the supervision of all activities on the leased tracts to ensure they are in conformance with the terms of the leases and approved plans. Exploration and Environmental Baseline Data Programs were initiated during 1974 by all lessees under the supervision of the AOSO. By the second anniversary of the leases, DDP's (Detailed Development Plans), including environmental protection and rehabilitation programs, were submitted to the AOSO for approval.

Subsequent to submission of the three original "DDP's" (two in Colorado, one consolidated plan in Utah), the three lessee groups requested 1-year suspensions of operations because of legal, technical, and economic problems which had developed in connection with high background levels of air pollutants and resource conservation. They were granted, effective September 1, 1976, for the two Colorado leases and November 1, 1976, for the two in Utah. The suspension period ended September 1, 1977, for the two Colorado tracts; however, because of litigation over title to the oil shale lands and resources in Utah, the suspension remained in effect for the two Utah tracts until March 1, 1982.

It had been expected that the initial oil shale developments would utilize conventional underground and surface mining methods to extract the oil shale followed by retorting in large surface plants. Capital investment requirements for such operations are extremely large, on the order of 4 to 6 billion dollars, which made them uneconomic at the price for oil in the late 1970's. The two Colorado lessees then took a different approach to development, which they believed would be economic at the anticipated world price of oil. These plans involved MIS (modified in situ) or in-place systems in which only a small part of the shale is mined and rubble-filled vertical chambers are created underground. These chambers become underground retorts from which the shale oil is produced, making the large, expensive surface plants unnecessary. Both projects indicated plans to also construct surface retorting plants to utilize that portion of the shale which must be mined and brought to the surface in an MIS operation. There appeared to be environmental as well as economic advantages to the in situ methods of development. However, it will be several years before actual commercial production of shale oil could begin from these projects and their feasibility demonstrated. The Colorado lessees began their development work in 1978 under revised DDP's which were reviewed and approved in the fall of 1977. After initial MIS testing on Tract C-a, Rio Blanco Oil Shale Company has decided not to proceed with commercial development using the MIS method. The Cathedral Bluffs Shale Oil Company is carrying out a comprehensive technical and economic reevaluation of MIS development of Tract C-b. The White River Project (Utah lease tracts U-a and U-b) will be developed by conventional underground mining with surface retorting as originally conceived.

Description and Status of Prototype Projects

Tract C-a. -

On September 3, 1981, the Rio Blanco Oil Shale Company announced a decision to construct and test a pilot scale surface retort at an eastern research facility rather than build a demonstration module on the lease tract at this time. Development of a planned small open-pit mine was also postponed and the onsite work force reduced significantly.

This 5,090-acre tract is located about 20 miles southeast of the town of Rangely in Rio Blanco County, Colorado. The equivalent of 6 billion barrels of shale are contained in a 1,100- to 1,200-foot interval of 25-gal/ton oil shale. Open-pit mining with off-tract surface retorting and spent shale disposal could recover an estimated 4 to 5 billion barrels of oil. That approach is now preferred by the operator, Rio Blanco Oil Shale Company, over other possible development methods which would achieve substantially lower resource recovery and be less economically attractive.

Under existing law, the Interior Department cannot authorize off-tract disposal or facility siting on Federal lands to facilitate development of a Federal oil shale lease. The outcome of congressional consideration of legislation, which includes (among other things) off-tract disposal authority, is critical to possible open-pit development of this lease.

Site development work was begun in 1978 with sinking of the 15-foot-diameter service production shaft. Surface facilities were constructed and additional underground development has included two smaller shafts which were upbored and the preparation of two MIS retorts. The two retorts were successfully operated and the MIS test completed in early 1982 with production of 24,440 barrels equivalent of shale oil from the second and larger of the two retorts. The Rio Blanco Company is now conducting pilot scale tests of a German retorting system (Lurgi-Ruhrgas) in Pennsylvania.

If open-pit mining becomes feasible, it would begin on a small scale (36 acres) which would expand to an eventual 750-acre "traveling" pit with an average depth of 1,400 feet. Initial surface production of shale oil would begin with a single demonstration retort module with phased expansion expected to reach an ultimate production of 100,000 barrels per day.

The initial water requirements for the demonstration module phase would be 1,600 acre-feet per year with ultimate requirements on the order of 17,000 acre-feet per year. Water will be obtained from underground water sources for the early years of development and perhaps longer. However, options on surface water from the White River are held by the project for future commercial scale production. Initial waste disposal would be off-tract, but after the open pit has reached its total depth (20 or more years), processed shale and overburden would be returned to the pit. Disposal sites would be restored and vegetated to predevelopment productivity. Current employment is under 200; construction work force for the demonstration phase is expected to approach 550, with 2,500 operational employees required for the full commercial facility. Capital costs thus far have been over $330

million with ultimate investment for the commercial development to be about $4 billion.

Tract C-b. -

On December 17, 1981, Occidental Petroleum Corporation and Tenneco, Inc., announced plans to delay development of their joint project to permit reassessment of the mine configuration and part of the processing facilities.

Located in Rio Blanco County, about 41 miles northwest of the town of Rifle, Colorado, this 5,040-acre tract contains the greatest total in-place oil shale resource of the four prototype leases. There is an estimated 13 billion barrels of oil equivalent in a 1,860-foot-thick section of oil shale averaging 18.6 gallons of oil per ton. However, the top of this sequence lies at a depth of about 1,200 feet beneath the surface, making open-pit mining impractical.

Tract C-b is being developed by the Cathedral Bluffs Shale Oil Company, with an MIS system and a surface retorting plant to be added to process the shale mined and brought to the surface from the underground retort development work. Over 1 billion barrels of oil are expected to be recovered from a 290-foot interval using this approach. Two large shafts and one smaller one have been completed. Concrete hoist towers were constructed above the two large shafts, and they are currently being fully equipped. The production shaft will have a 60,000-ton-per-day capacity. Ultimate commercial production from the combined MIS and above-ground plant is projected to be 117,000 barrels of oil per day by 1992. Ammonia and a low Btu gas will be byproducts from the operation.

Water requirements of 9,900 acre-feet per year will be suplied from mine pumpage (dewatering) and from surface rights on the Piceance Creek and White River system. Retorted shale will, of course, remain underground in the MIS process while disposal of that from the surface plant will be placed on the surface with a reconstructed soil horizon for revegetation.

Employment in August 1981 was 560 (now significantly reduced), with peak construction work force in 1988 to be about 5,200 with a permanent operational staff of 4,400 after 1992. Investment thus far in the project is on the order of $300 million with a $5.9 billion total requirement projected to bring it to full commercial development.

Tracts U-a and U-b. -

On March 1, 1982, the White River Shale Oil Corporation, with the concurrence of the Federal Government, requested that the U.S. District Court in Salt Lake City lift the injunction which has kept the two oil shale lease tracts in suspension since 1977. The Court has so ordered, thus clearing the way for the start of development. Following the Court's action, the Oil Shale Office of the U.S. Minerals Management Service, approved the White River Detailed Development Plan on March 2. A joint development agreement for the two tracts was also executed by the lessees and the Bureau of Land Management on that day.

The two adjoining 5,120-acre lease tracts are located in the eastern part of the Uintah Basin, about 42 miles southeast of Vernal, Utah. They will be

developed jointly as the White River Shale Project through the application of underground room and pillar mining methods combined with surface retorting of the mined rock.

The mining zone, 55 feet of 28-gal/ton oil shale, contains approximately 1.05 billion barrels of oil equivalent, of which 63 percent or about 662 million barrels are estimated to be recoverable from the two tracts by this approach.

Beginning in 1982, the development of the project is scheduled in three phases: Phase I to produce 15,930 barrels of upgraded shale oil per day in 1987; Phase II, 60,940 barrels per day in 1991; and culminating with a full production rate of 113,950 barrels per day in Phase III in 1994. Sulfur and ammonia will also be produced as byproducts of the upgrading process.

Water requirements of 2,700 acre-feet per year in Phase I, increasing to 22,600 acre-feet in Phase III, will be supplied from the White River, initially from alluvial wells, but eventually from the White River Reservoir planned by the State of Utah. Waste disposal will be on the surface in Southam Canyon on Tract U-a, with appropriate restoration and vegetation of the site.

Construction employment is projected to reach 576 by the end of 1982 and peak at 5,083 by 1989, with operational employees totaling 3,353 in 1994 for full commercial production. Total capital costs for the project are estimated at $3.3 billion in 1981 dollars.

Legal Actions

In addition to the litigation over title to oil shale lands and resources in Utah, which involved the State, oil shale mining claims, and applicants for State leases as well as the Federal Government, two lawsuits have been instituted against the Prototype Program by environmental groups. The first, filed in December 1976, challenged the legality of the suspensions. It was dismissed for failure to include the lessees as indispensable parties. The second suit, filed in December 1977, by the Environmental Defense Fund, The Colorado Open Space Council, and Friends of the Earth, challenged the approval of the Development Plans for the two Colorado projects, arguing that additional Environmental Impact Statements should be required. The Federal District Court rejected that argument and affirmed the Department's actions under the Prototype Program on August 25, 1978. On appeal, the decision was affirmed by the 10th Circuit Court of Appeals in March 1980. In August 1978, the U.S. Circuit Court of Appeals ruled in favor of the claim by the State of Utah to over 157,000 acres of oil shale lands, including the two Utah lease tracts. That decision was reversed by the U.S. Supreme Court in May 1980.

The Oil Shale Panel

Background

As the Prototype Program evolved under the Interagency Task Force, the need was recognized for a continuing mechanism for review and coordination between the various Government agencies and the public sectors concerned with oil shale after leasing and during development. From the concept of continuing

the operation of the Oil Shale Field Task Force, the idea evolved through an all Federal "Technical Advisory Board," as described in the Final EIS, and ultimately to the OSEAP as established in 1974. It combines interagency and intergovernmental coordination and review with public participation in a formal advisory body.

Authority

OSEAP was originally established by a charter issued by the Secretary of the Interior on February 27, 1974, under the authority of the Federal Advisory Committee Act (Public Law 92-463). It is further governed by the Office of Management and Budget Circular A-63 (as revised) and by the Interior Department Manual (615 DM 3, Release 1621). Charters for such advisory committees are issued for 2-year terms at the end of which they are subject to review for continuation and may be renewed for additional 2-year terms.

Key Charter and Manual Provisions

The responsible Interior Department official is the Assistant Secretary - Land and Water Resources, who shall, after consultation with the Assistant Secretary - Energy and Minerals, appoint the Chairman and a Liaison Officer in Washington, D.C.

OSEAP shall:

1. Assist the Department in attaining the objectives of the Prototype Program;

2. Ensure maximum public participation;

3. Advise the Oil Shale Manager of the Minerals Management Service and District Managers of the Bureau of Land Management on environmental matters in connection with their responsibilities under the Prototype Oil Shale Leasing Program;

4. Advise the Department of Energy on environmental aspects of its oil shale programs upon special request to the Assistant Secretary - Land and Water Resources by that agency;

5. Respond promptly to requests for advice; and

6. Assist in conducting public hearings.

BLM and MMS shall:

1. Consult the Panel on the enforcement of the environmental provisions of the oil shale leases - normally in advance of a decision; and

2. Not approve plans or significant modifications nor issue permits or rights-of-way until they have been submitted to the Panel for review and members have had a reasonable opportunity to comment thereon.

Appeal Rights. - Any OSEAP member who is dissatisfied with an action by an Interior field official may bring it to the attention of the Panel and, if it cannot be resolved, appeal through channels to the Secretary of the Interior.

Panel Activities 1974-1981

Public Meetings	Thirty-four 1- to 2-day meetings were held in Denver, Grand Junction, Meeker, and Rangely, Colorado; Bottle Hollow, Park City, Salt Lake City, and Vernal, Utah; and Laramie and Rock Springs, Wyoming.
Temporary Work Groups	Six to develop environmental guidelines in 1974, six to address major environmental aspects of lessees' operations in 1975, and three for DDP review in 1975. Similar work groups were reestablished in 1980 to consider revisions of DDP's.
Matters Reviewed	Three Exploration and Environmental Baseline Programs (one for each prototype lease project); six DDP's (three original and three revised or modified); and two major modifications of an approved plan; all rights-of-way for roads, powerlines, and pipelines; off-tract installations such as water monitoring stations, meteorological stations, vegetation study sites, etc.
Advice to the Secretary of the Interior	In response to special requests from the Assistant Secretary - Land and Water Resources, OSEAP has provided advice on alternative water sources for oil shale development, accelerated in situ technology development and proposed leasing of additional tracts, and a proposal to establish a similar coal adivsory panel.
Informational Activities for Panel Members	Aerial survey of oil shale region; several field trips to all the leased tracts, the Colony Project, the Occidental Logan Wash site, the Paraho operation at Anvil Points; a meeting in a "boom" town (Rock Springs, Wyoming); and briefings at each meeting by Federal, State, and local government or industry representatives on their programs, problems, or information of interest.
Papers and Presentations	For: The Rocky Mountain Association of Geologists' 1974 Guidebook; The Environmental Oil Shale Symposium in Golden, Colorado, October 1975; the American Institute of Chemical Engineers Annual Meeting in Los Angeles, California, November 1975; and presentations at other technical meetings and symposiums as well as at colleges and universities.

Annual Reports	Seven required statistical reports, narrative annual reports to the Secretary of the Interior in 1975 and 1976, and summary reports in 1979 and 1982.
Recognition	OSEAP was a positive factor in the outcome of the 1977 suit by three environmental organizations challenging Interior's compliance with NEPA in the Prototype Program. The Federal District Court upheld the Department and was affirmed by the Circuit Court of Appeals. The decision held that the Department had consistently complied with the letter and spirit of NEPA and cited the Oil Shale Panel and its work as a good example of that compliance.

Example of OSEAP Review Procedure

1981 Detailed Development
Plan for Tracts U-a and U-b
(White River Shale Project -
Uinta County, Utah)

November 14, 1980	Final Draft of DDP distributed to Panel Members for review.
December 9, 1980	OSEAP meeting (Grand Junction, Colorado) at which the White River Project staff presented a briefing on this DDP and responded to written and oral questions and comments from panel members.
January 13, 1981	OSEAP Meeting (Denver, Colorado) at which the minutes of December 9 OSEAP meeting, including discussion of WRSP draft DDP, were distributed.
September 3, 1981	Federal Register notices announcing the availability of the formally submitted DDP, two public hearings, and the OSEAP meeting on October 28 and 29 to review it.
September 10, 1981	Copies of the White River Plan and a Socioeconomic Supplement distributed to Panel Members with work group assignments and information on public hearings and the OSEAP meeting.
October 21, 1981	Public Hearing conducted by the Panel Chairman in Vernal, Utah, to receive comments on the DDP (transcript supplied to OSEAP members for consideration in Panel's review).
October 28-29, 1981	OSEAP meeting and second Public Hearing; formal review of DDP by Panel and adoption of advice to the USGS Deputy Conservation Manager-Oil Shale on the Development Plan and the Socioeconomic Supplement.

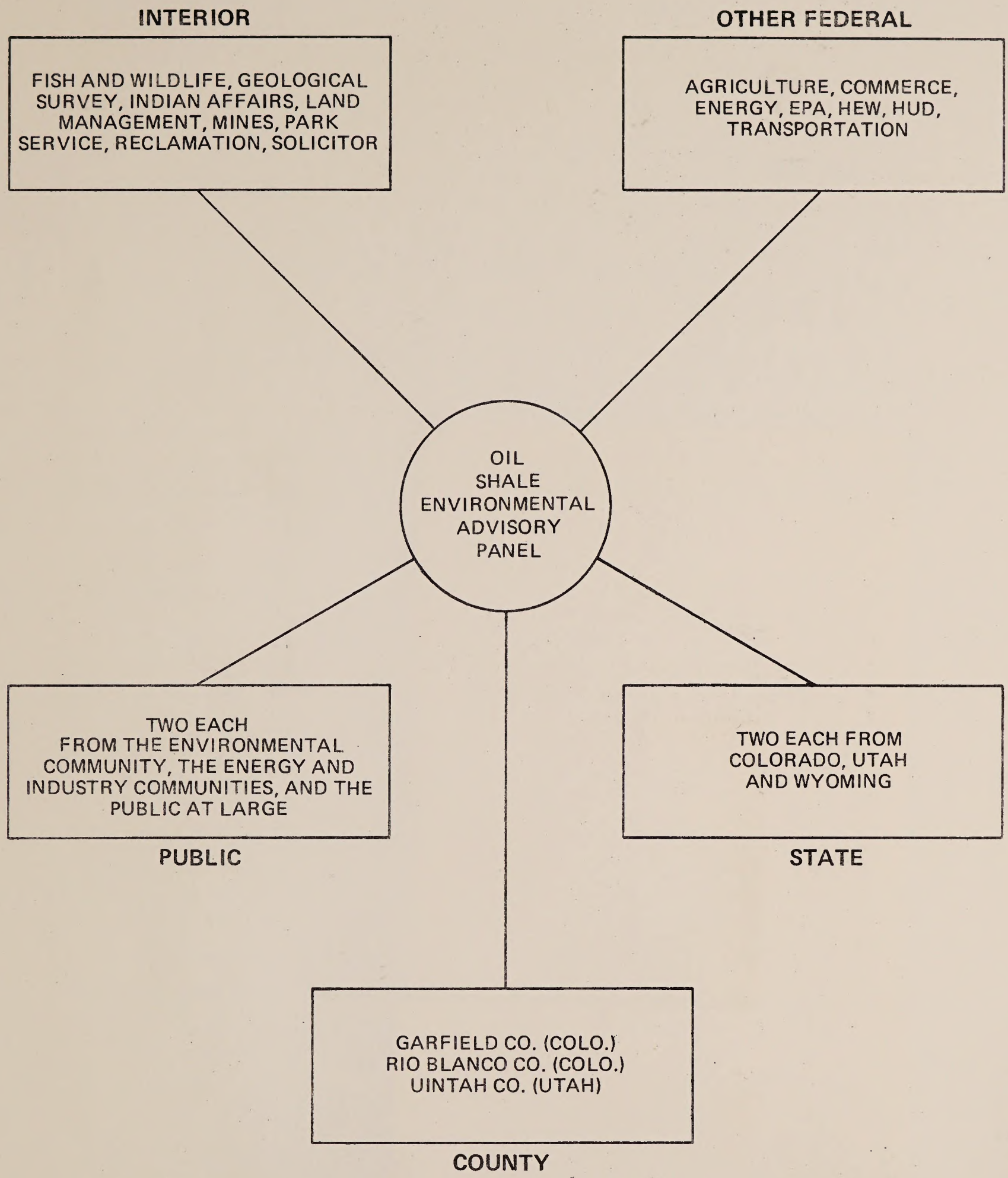
November 6, 1981	Memorandums from Chairman OSEAP formally transmitting Panel advice and comments on the White River DDP and Socioeconomic Supplement to the USGS Deputy Conservation Manager - Oil Shale.
March 2, 1981	Formal approval of the Detailed Development Plan for The White River Shale Project (lease Tracts U-a and U-b) by the Deputy Minerals Manager - Oil Shale, of the New Minerals Management Service.

Panel Suspension and Reestablishment

The OSEAP charter expired at the end of December 1977 without being renewed. At that time all such advisory groups were subject to a rigorous review and the total number reduced substantially. General support for the reestablishment of the Oil Shale Panel was expressed thereafter by certain members of Congress, other Federal agencies, and local governments. The decision to reactivate the Panel was announced in August and a new charter signed by Secretary of the Interior Andrus on September 19, 1978.

The charter was last renewed in October of 1980 and amended in May of 1981. The authorized membership of OSEAP is currently 31 including the chairman. They represent eight Interior bureaus or offices, seven other Federal agencies, the three oil shale States (two members each, named by the Governors of Colorado, Utah, and Wyoming), two counties (Rio Blanco, Colorado, and Uintah, Utah) which have leases within them, and one county (Garfield, Colorado) which is significantly impacted by the two projects in adjoining Rio Blanco County. Six public members are authorized; two each representing the environment/public interest, the energy/industry sectors, and the public at large.

The responsible Interior Department official is Garrey E. Carruthers, Assistant Secretary - Land and Water Resources, in Washington, D.C.; George Thomas on Mr. Carruthers' staff, serves as the Oil Shale Liaison Officer in Washington; and Henry O. Ash, an Interior employee in Denver, is the Panel Chairman.



PANEL MEMBERSHIP